ENCLOSURE: TECHNICAL SUPPORT DOCUMENT FOR EPA CONCURRENCE ON 24-HOUR $PM_{2.5}$ EXCEEDANCES MEASURED IN CACHE COUNTY, UTAH AUGUST AND SEPTEMBER 2017, AS EXCEPTIONAL EVENTS

EXCEPTIONAL EVENTS RULE REQUIREMENTS

The EPA promulgated the Exceptional Events Rule (EER) in 2007, pursuant to the 2005 amendment of Clean Air Act (CAA) Section 319. In 2016, the EPA finalized revisions to the EER. The 2007 EER and the 2016 revisions added 40 CFR 50.1(j)-(r), 50.14 and 51.930 to the Code of Federal Regulations (CFR). These sections contain definitions, criteria for EPA approval, procedural requirements and requirements for air agency demonstrations. The EPA reviews the information and analyses in the air agency's demonstration package using a weight of evidence approach and decides to concur or not concur. The demonstration must satisfy all of the EER criteria for the EPA to concur with excluding the air quality data from regulatory decisions.

Under 40 CFR 50.14(c)(3)(iv), the air agency demonstration to justify data exclusion must include:

> A. "A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s);"
> B. "A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation;"
> C. "Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times" to support requirement (B) above;
> D. "A demonstration that the event was both not reasonably controllable and not reasonably preventable;" and
> E. "A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event."

A natural event is defined in 40 CFR 50.1(k) as "an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions."

In addition, the air agency must meet several procedural requirements, including:

1. Submission of an Initial Notification of Potential Exceptional Event and flagging of the affected data in the EPA's Air Quality System (AQS) in accordance with 40 CFR 50.14(c)(2)(i),
2. Completion and documentation of the public comment process in accordance with 40 CFR 50.14(c)(3)(v), and
3. Implementation of any applicable mitigation requirements in accordance with 40 CFR 51.930.

For data influenced by exceptional events to be used in initial area designations, air agencies must also meet the initial notification and demonstration submission deadlines specified in Table 2 to 40 CFR 50.14.

Narrative Conceptual Model

A wildfire is defined in 40 CFR 50.1(n) as "any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event." Wildland is defined in 40 CFR 50.1(o) as "an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered."

The EPA expects that a narrative conceptual model of the event will describe and summarize the event in question and provide context for analyzing the required statutory and regulatory technical criteria. Air agencies may support the narrative conceptual model with summary tables, satellite images, maps, etc. For high particulate matter events resulting from wildland fires, the EPA recommends that the narrative conceptual model discuss the interaction of emissions and meteorology and, under 40 CFR 50.14(a)(1)(i), the regulatory significance of the requested data exclusion.

Clear Causal Relationship (CCR) and Supporting Analyses

The EPA considers a variety of evidence when evaluating whether there is a clear causal relationship between the specific event and the monitored exceedance or violation. For high particulate matter concentrations resulting from wildland fires, air agencies should compare the relevant particulate matter data requested for exclusion with historical concentrations at the affected air quality monitor to establish a clear causal relationship between the event and the monitored data. In addition to providing this information on the historical context for the event-influenced data, air agencies should further support the clear causal relationship criterion by providing evidence that the wildfire's emissions were transported to the monitor and that the emissions from the wildfire influenced the monitored concentrations.

Not Reasonably Controllable or Preventable (NRCP)

The EPA requires that air agencies establish that the event be both not reasonably controllable and not reasonably preventable at the time the event occurred. This requirement applies to both natural events and events caused by human activities; however, if the event was caused by a wildfire on wildlands, it will be presumed that both "not reasonably controllable or preventable" elements have been met, unless evidence in the record clearly demonstrates otherwise.

Natural Event or Event Caused by Human Activity That is Unlikely to Recur

According to the CAA and the EER, an exceptional event must be "an event caused by human activity that is unlikely to recur at a particular location *or* a natural event" (emphasis added). The 2016 EER includes in the definition of wildfire that "[a] wildfire that predominantly occurs on wildland is a natural event." Once an agency provides evidence that a wildfire on wildland occurred and demonstrates that there is a clear causal relationship between the measurement under consideration and the event, the EPA expects minimal documentation to satisfy the "human activity that is unlikely to recur at a particular location or a natural event" element. The EPA will address wildfires on other lands on a case-by-case basis.

EPA REVIEW OF EXCEPTIONAL EVENT DEMONSTRATION

Overview of Events

This Technical Support Document (TSD) covers four exceedances of the 24-hour $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) at the Smithfield monitoring station in Cache County, Utah, in 2017. The first of the four 24-hour $PM_{2.5}$ exceedances occurred on August 6, 2017, and the remaining three occurred on September 5 – 7, 2017. The Utah Department of Environmental Quality, Division of Air Quality (DAQ) submitted two separate exceptional events demonstrations to address these events, an August 6 – 7, 2017 demonstration (referred to as the August demonstration in this TSD) and a September 5 – 7, 2017 demonstration (referred to as the September demonstration in this TSD). The August demonstration included only Smithfield events, whereas the September demonstration included events at additional monitors in the Wasatch Front. The events at these additional sites were not considered in this TSD due to lack of regulatory significance.

When the August demonstration was initially submitted, both the August 6, 2017 and August 7, 2017 24-hour $PM_{2.5}$ values exceeded the NAAQS, and were contributing to the Smithfield violation. Subsequent to the demonstration submittal, but prior to the completion of this TSD, the $PM_{2.5}$ data reported in the demonstration was nulled in AQS. This was due to the discovery of an incorrect setting in the reporting instrument which caused unacceptable flow rates. As a result, the Utah DAQ designated a different instrument at the Smithfield monitoring site as the primary monitor for the affected time period. The resulting data happen to be lower than the original data, and therefore the current $PM_{2.5}$ data in AQS for August 7, 2017, does not currently exceed the NAAQS and does not affect the 2017 annual 98^{th} percentile value. Therefore, it was not considered in this TSD due to lack of regulatory significance.

The DAQ submitted an Initial Notification of Potential Exceptional Event for the August demonstration on August 24, 2017, and provided notification on the September events verbally in subsequent phone calls. The August demonstration was posted for public comment for 30 days, from October 1 to November 1, 2017, and DAQ received one comment on the causation relationship between the wildfire smoke and the noted exceedances. The September demonstration was posted for public comment for 30 days, from November 15 to December 15, 2017, and DAQ received no comments. The EPA received the August and September demonstrations on November 1, 2017 and January 9, 2018, respectively.

Narrative Conceptual Model

The Cache Valley of Northern Utah and Southeastern Idaho is located on the western side of the Rocky Mountains. The valley is surrounded by steep mountain ranges to the east (Bear River Range) and, south (Wasatch Range), and west (Wellsville Mountains and Malad Range), and hills to the north. Because the valley is mostly surrounded by high topographic features, air tends to stagnate in the valley during times of stable atmospheric conditions, especially during strong wintertime inversions. As a result of this stagnation, as well as the climate and air pollution, the Cache valley has historically experienced high levels of air particulates, especially in the wintertime (December through the end of March). Data to support this statement is included in the Historical Data for Context section of this TSD.

In the summers, the Cache Valley does not experience these strong and persistent inversions, and as a result, traditionally records much lower air particulate concentrations. Regardless, elevated $PM_{2.5}$ concentrations in the summer months are possible, particularly when smoke is transported to the area from wildfires in the region (and elevated $PM_{2.5}$ in summer is rare or non-existent in the absence of

smoke). The August and September demonstrations suggest that this was the case during the 2017 events.

August 6, 2017

Leading up to and during the August 6, 2017 event, there were numerous wildfires burning throughout the northwestern United States and western Canada. For example, in California, the Detwiler, Modoc July Complex, and the Orleans Complex fires started in mid to late July. In Oregon, the Chetco Bar Fire started on July 12, the Cinder Butte Fire started on August 2, and the Whitewater fire was discovered on July 23, 2017. In Idaho, the Highline fire began as a lightning strike on July 28, 2017, and was just one fire in a series of fires that broke out in the Payette National Forest. In Montana, the Meyers and Rice Ridge fires were caused by lightning on July 14 and July 24, 2017, respectively. In Washington, the Diamond Creek Fire started on July 23, 2017, and the Noisy Creek Fire started on July 15, 2017. In British Columbia, a record breaking wildfire season began with fires igniting on July 6, 2017. There were numerous other fires burning during this time period, but this short list helps to convey the wide spatial distribution of these events, and the number of large fires burning during the August 6 event.

The DAQ's August demonstration provided a narrative of how smoke from these wildfires was transported to Utah and caused the 24-hour $PM_{2.5}$ NAAQS exceedances on August 6, 2017. With this narrative, they provided a map of the locations of western fires burning and the NOAA Hazard Mapping System (HMS) smoke plume map for August 6, 2017 (Figure 1). The map shows both the large fire complexes listed, as well as a few smaller fires just north of Utah in Idaho.

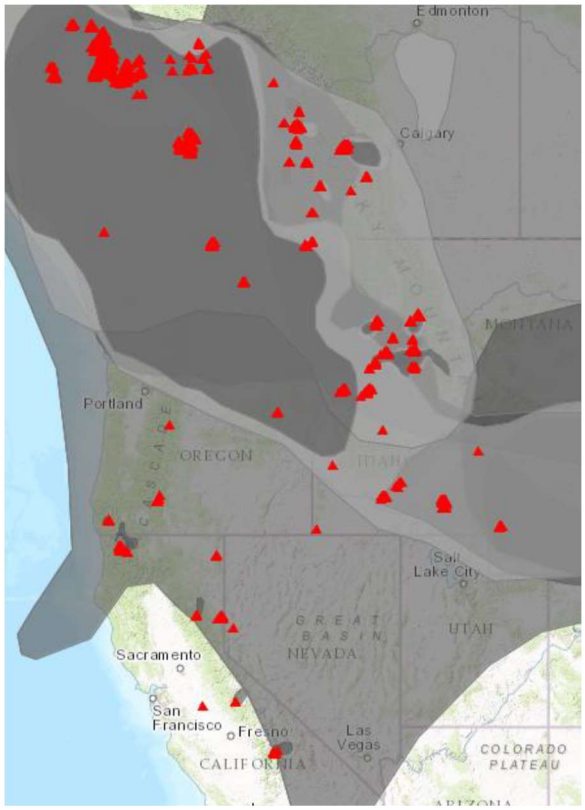

Figure 1 (left). NOAA HMS smoke plume map for August 6, 2017, with locations of active fires

September 5 – 7, 2017

Dry and hot conditions persisted throughout August and into September 2017. As a result, numerous large wildfires started or continued to burn throughout the northwestern United States and western Canada leading up to and during the September 5 – 7 events. In fact, "as of September 6, there were 65 ongoing fires across the United States according to the National Interagency Fire Center, all of which were located in the western United States."[1]

DAQ's September demonstration provides a narrative of how smoke from wildfires across the west was transported to Utah between September 5 and September 7, 2017. This smoke resulted in exceedances of the 24-hour $PM_{2.5}$ NAAQS at stations throughout the northern part of Utah. The demonstration included a number of figures of the location of fires in the western United States and Canada, as well as NOAA HMS smoke plume maps (Figure 2 through Figure 4).

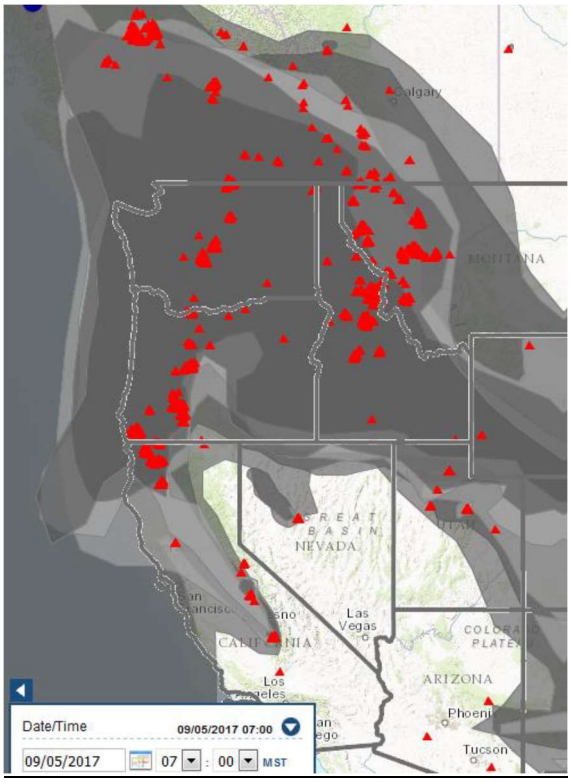

Figure 2.Fire locations and NOAA HMS smoke plume map for September 5, 2017

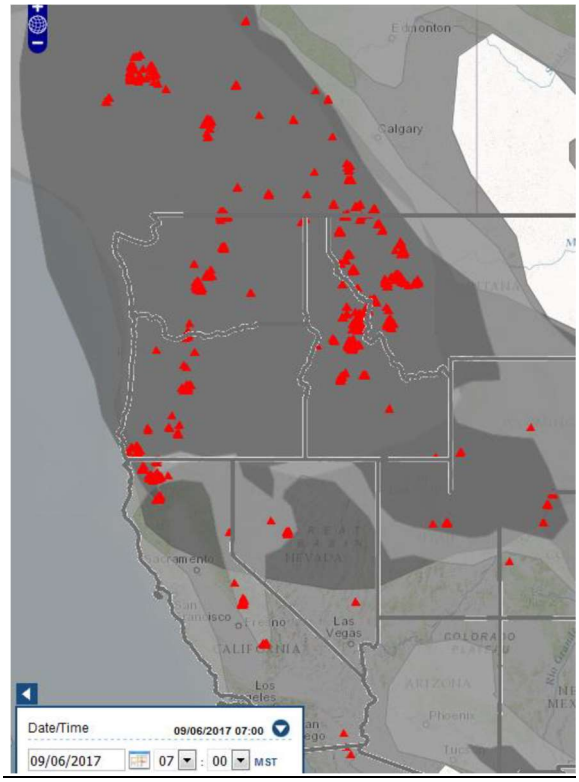

Figure 3. Fire locations and NOAA HMS smoke plume map for September 6, 2017

[1] Di Liberto, Tom (2017, September 7). "Massive fires burning across the West in September 2017." Retrieved from https://www.climate.gov/news-features/event-tracker/massive-fires-burning-across-west-september-2017. Accessed on May 17, 2018.

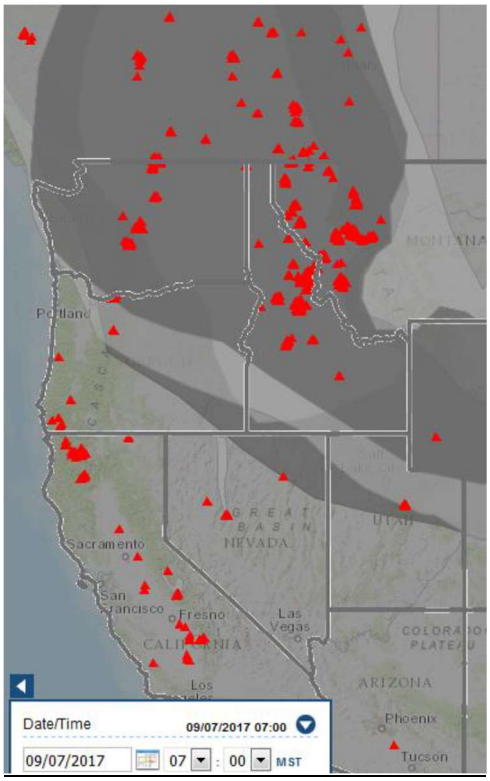

Figure 4. Fire locations and NOAA HMS smoke plume map for September 7, 2017

Regulatory Significance

Neither the August nor September demonstration indicated the regulatory significance of the exceptional events. Therefore, the EPA added this regulatory significance section to the TSD.

In 2006, the EPA strengthened the 24-hour $PM_{2.5}$ NAAQS from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. In 2009, 3 years following the NAAQS revision, areas were designated, and parts of Cache County, Utah and Franklin County, Idaho were designated non-attainment. This nonattainment area (NAA) is called the Logan, UT-ID NAA, and was subsequently classified as Moderate under CAA subpart 4, part D, title I.

The Logan UT-ID NAA had an attainment deadline of December 31, 2015. In response to air quality data and multiple extension requests submitted to the EPA, we extended the attainment deadline to December 31, 2017, in accordance with the section 188(d) of the CAA. 2017 monitoring data is to be certified by May 1, 2018; under CAA section 188(b)(2) the EPA must determine by June 30, 2018, if the area has attained the 2006 24-hour $PM_{2.5}$ NAAQS.

Smithfield is the only monitor in the Utah portion of the Logan, UT-ID NAA. It was installed in early 2015, but did not have four complete quarters of data in 2015. As stated in 40 CFR part 50, appendix N, section 4.2, without three complete years of data, this monitor cannot produce a valid attaining design value, but can produce a valid design value that violates the NAAQS. Without acting on these select events in the August and September demonstrations, Smithfield would have a valid design value violating the 2006 24-hour $PM_{2.5}$ NAAQS with less than complete data.

By concurring on the exceptional event demonstration for the August 6, 2017 event and all three Smithfield events in September, the resulting 3-year design value for Smithfield by itself will be

considered incomplete, but it will no longer be violating the NAAQS and so will be an invalid attaining design value. To create a valid design value, the EPA provides in a separate memorandum in this docket for this action, an analysis of how to combine the data from the Smithfield and Logan $PM_{2.5}$ monitors.

Clear Causal Relationship (CCR)

This Clear Causal Relationship section has been divided into an August 6, 2017, and a September 5 – 7, 2017 section in order to describe the clear causal relationship of the individual demonstrations adequately. In addition, historical $PM_{2.5}$ data from the Cache Valley has been presented for context.

August 6, 2017

The following discussion on the clear causal relationship has been modified from the DAQ's August demonstration:

Wildfire smoke from western wildfires began to migrate into Utah around July 31, 2017. The NOAA HMS smoke plume map for August 1, 2017, is show below (Figure 5). By the first of August, smoke had penetrated into Northern Utah and plumes intensified in Northern Utah by August 4, 2017 (Figure 6).

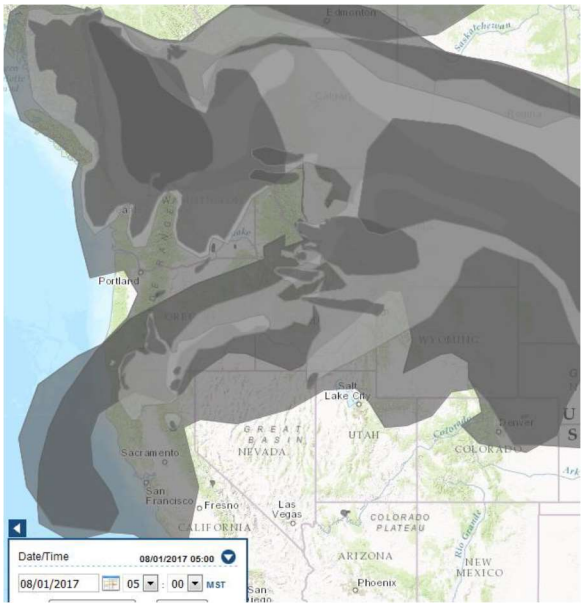

Figure 5. NOAA HMS smoke plume map of western United States on August 1, 2017

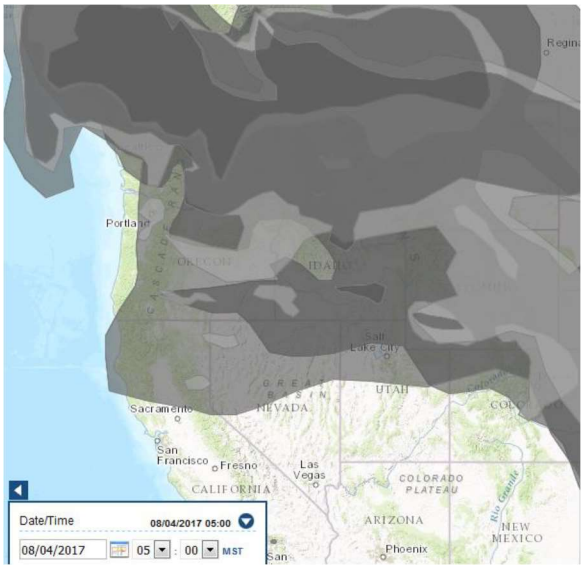

Figure 6. NOAA HMS smoke plume map of western United States on August 4, 2017

The 24-hour and hourly $PM_{2.5}$ time series for the three northern monitoring stations show elevated $PM_{2.5}$ levels corresponding with the smoke map projections starting August 3 (Figure 7).

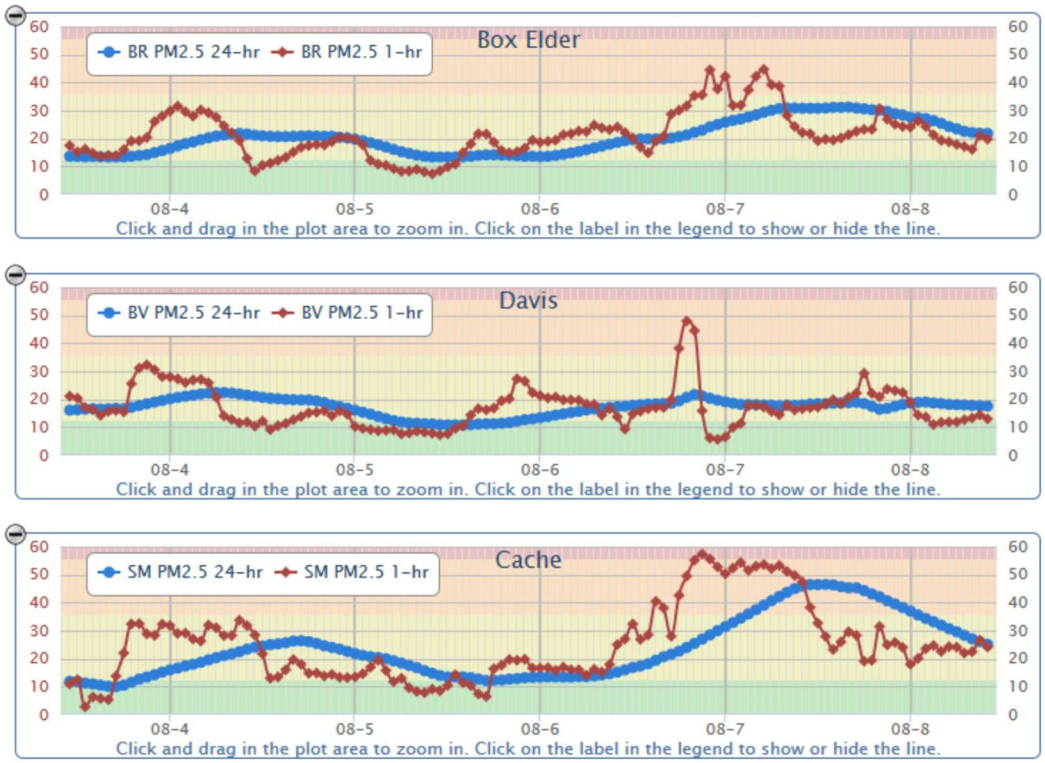

Figure 7. 24-hour and houlry average $PM_{2.5}$ concentrations at the Smithfield monitor from August 3 through August 8 2017

The 500 mB height contour map for August 5, 2017, shows stagnant conditions with a north westerly flow to the southeast due to a weak trough in the Gulf of Alaska (Figure 8). This caused smoke transport to Utah from California, Oregon and Idaho.

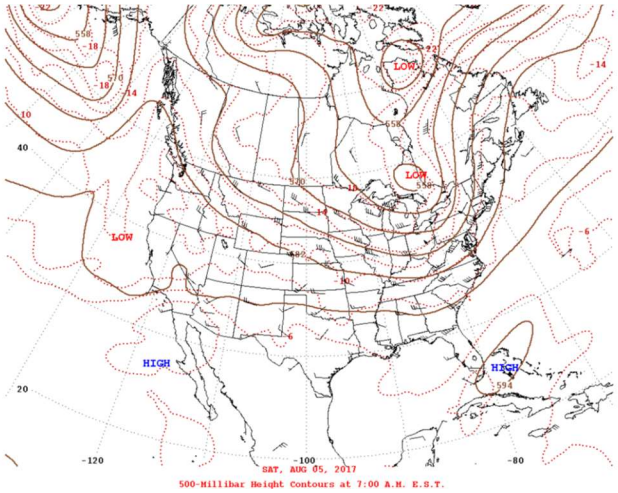

Figure 8. 500 mB height contour map for August 5, 2017

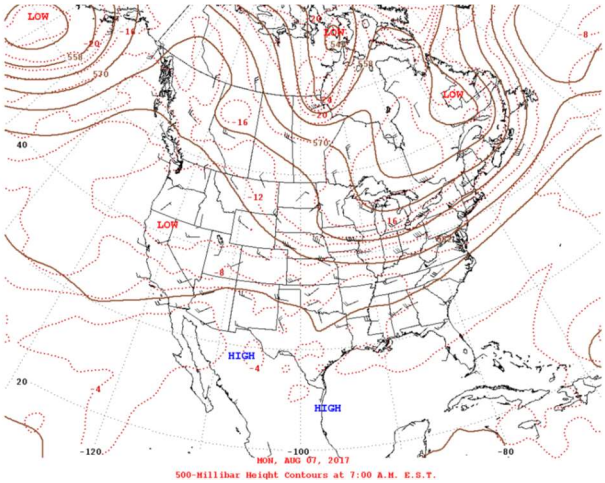

Figure 9. 500 mB height contour map for August 7, 2017

The trough continued to weaken on August 6 and 7, creating a stabilizing effect on the upper air mass that resulted in increased smoke plume stagnation (Figure 9).

Smoke transport can be visibly verified with MODIS satellite imagery, but cloud cover makes the area of interest difficult to see. The red markers are the wildfire locations. The off-gray wisps are smoke plumes, and the brilliant white areas are clouds (Figure 10).

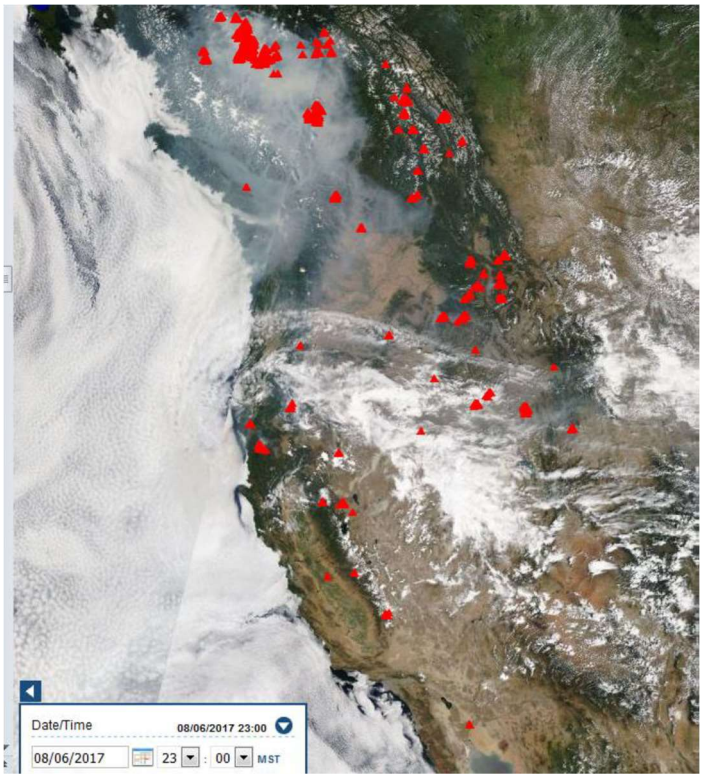

Figure 10. MODIS satellite imagery and wildfire locations for August 6, 2017

Aerosol optical depth (AOD) is the degree to which aerosols prevent the transmission of light. AOD measurements can provide supporting evidence for smoke plume migration.

These are a series of AOD overlays on the MODIS satellite image starting on August 3, 2017, when visible smoke was evident in Northern Utah (Figure 11 through Figure 13). Smoke intensity is indicated by an increasing color scheme, with red as the maximum AOD.

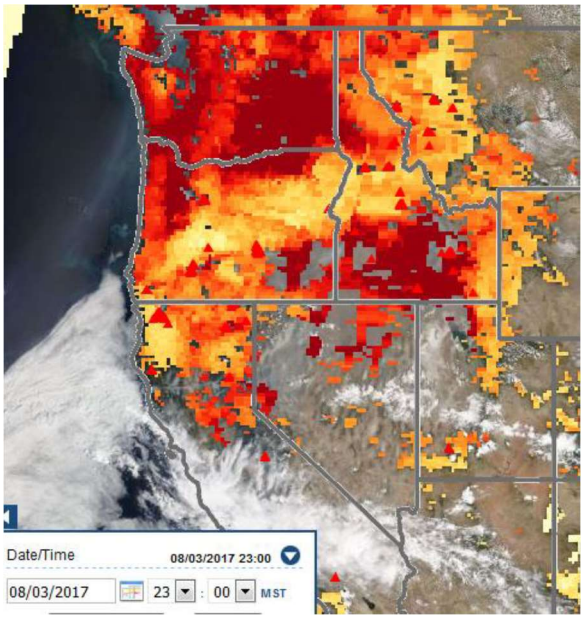

Figure 11. NASA MODIS Terra Aerosol Optical Depth for August 3, 2017

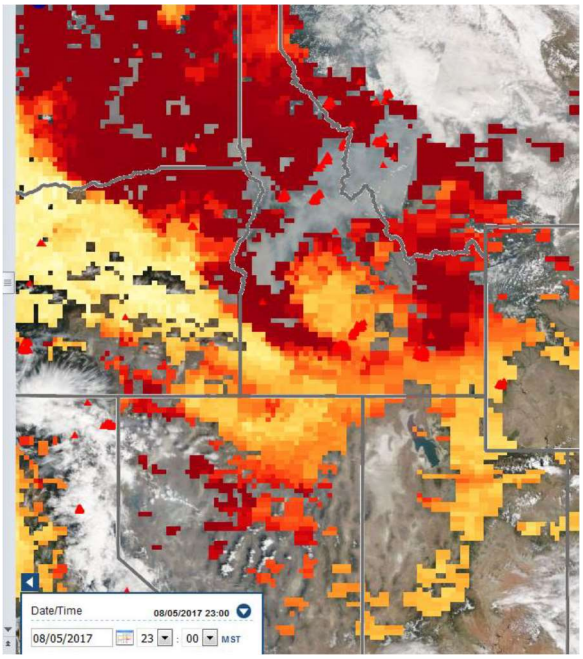

Figure 12. NASA MODIS Terra Aerosol Optical Depth for August 5, 2017

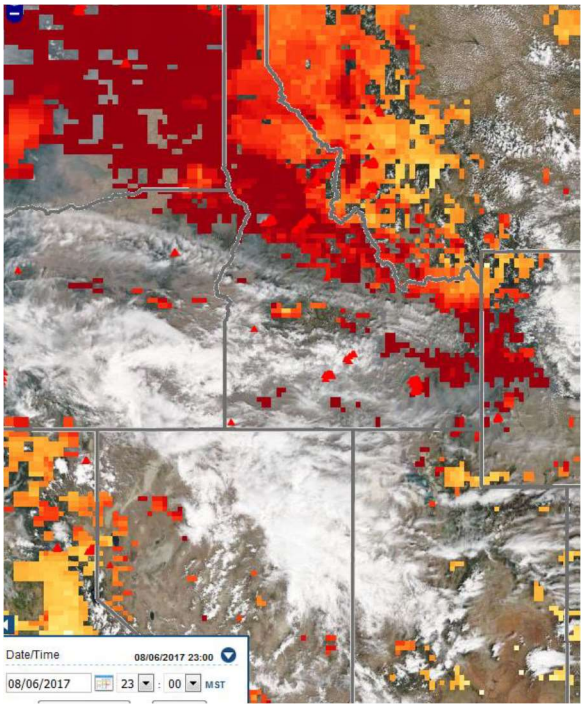

Figure 13. NASA MODIS Terra Aerosol Optical Depth for August 6, 2017

Wildfire hot spots are readily recognizable by the intensity of the red clustered areas. Varying degrees of AOD signal return is noted in Northern Utah (yellow to red). This signal return is consistent with downwind smoke.

The Naval Aerosol Analysis and Prediction System (NAAPS) provides an estimate of surface smoke concentration (Figure 14). NAAPS estimated that the surface concentrations were between 32 and 64 $\mu g/m^3$ on August 6. The measured concentration at the station was 36.8 $\mu g/m^3$ on August 6.

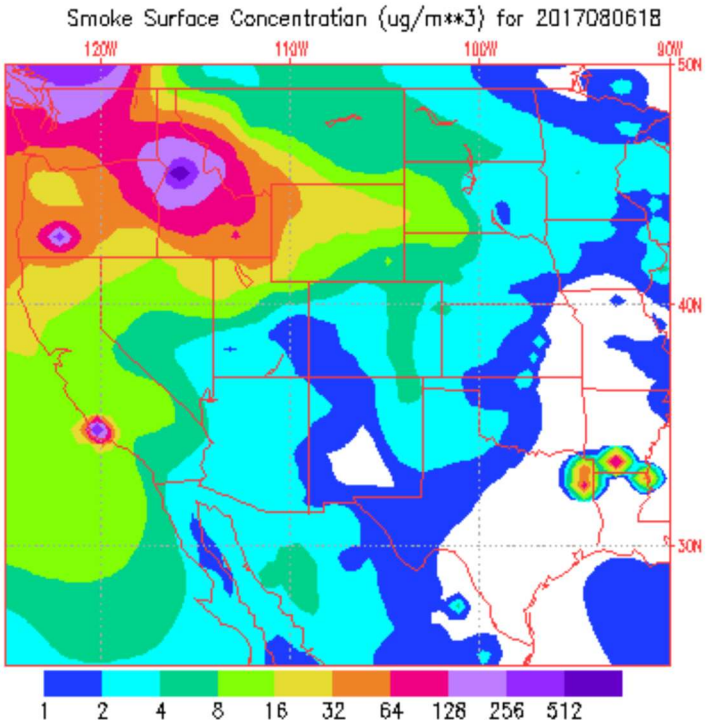

Figure 14. Naval Aerosol Analysis and Prediction System surface smoke concentration

HYSPLIT back-trajectory 24-hour modeling for August 5 – 7, 2017, indicates that a mix of smoke plumes contributed to the $PM_{2.5}$ exceedances. Figure 15 depicts the back trajectories, while Figure 16 shows an overlay of the back-trajectories on the NOAA HMS smoke map.

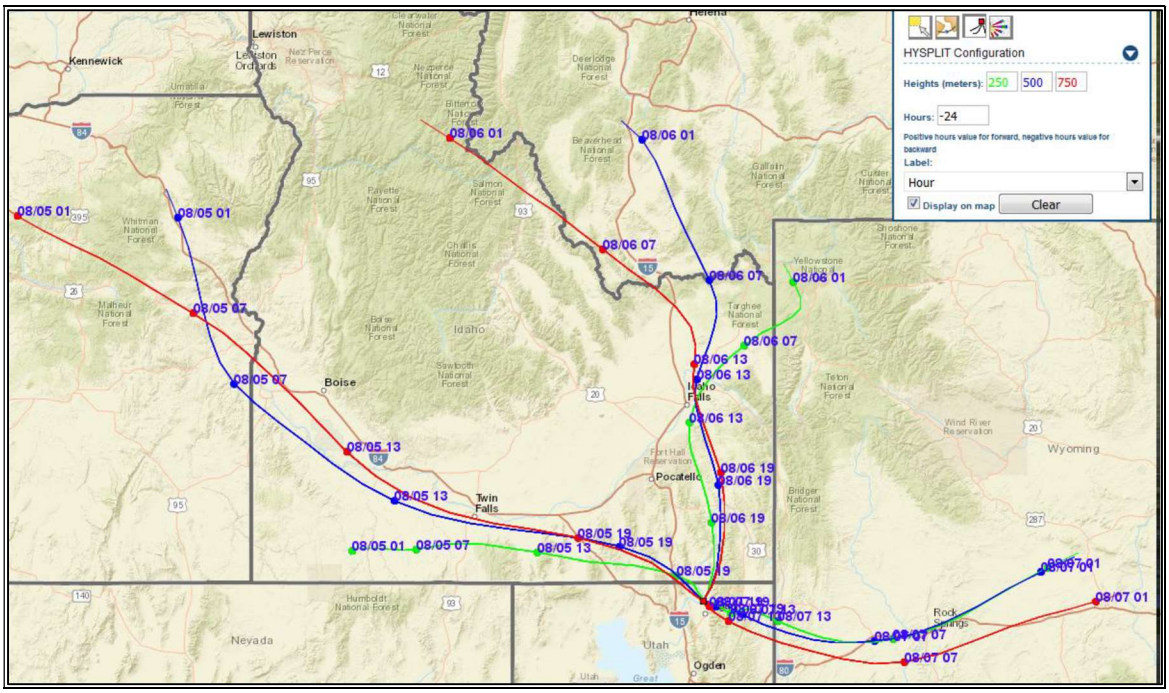

Figure 15. HYSPLIT back-trajectory 24-hour modeling for August 5 – 7, 2017

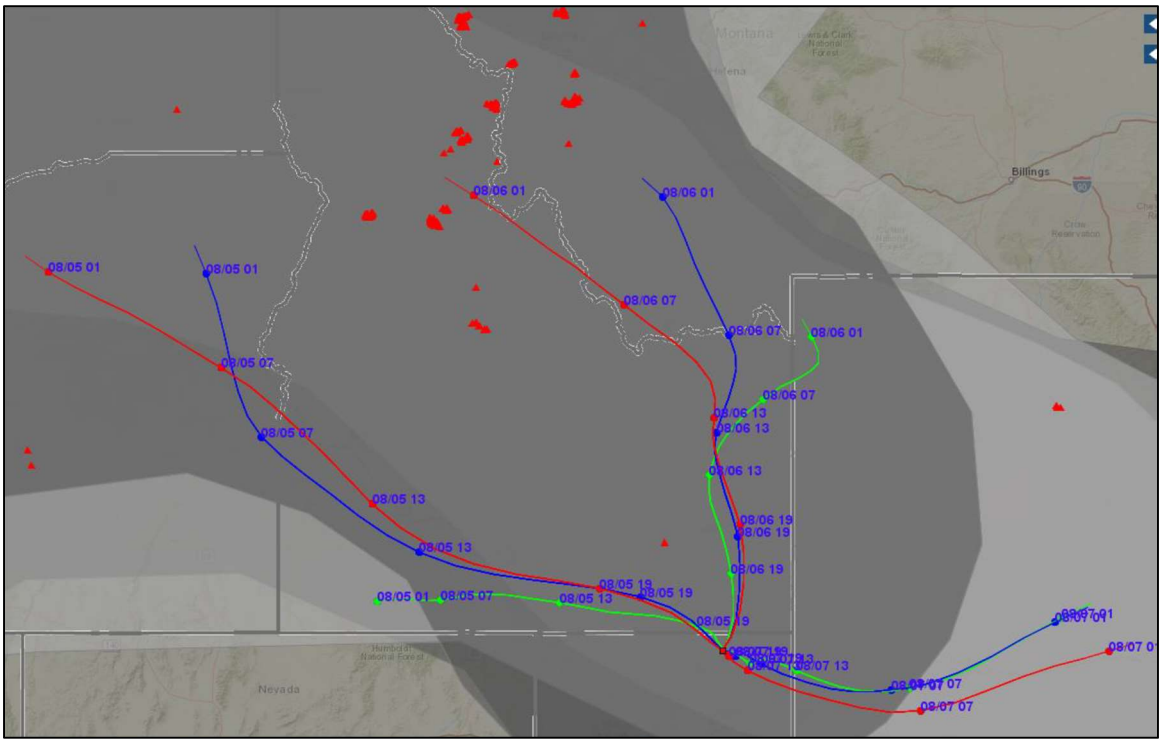

Figure 16. HYSPLIT back-trajectory over NOAA HMS smoke plumes

September 5 – 7, 2017

The following discussion on the clear causal relationship has been modified from the DAQ's September demonstration:

The 24-hour and hourly average $PM_{2.5}$ time series for the Smithfield monitoring station show elevated $PM_{2.5}$ levels corresponding with the smoke map projections starting September 5, 2017 (Figure 17). This is consistent with other monitoring stations in northern Utah.

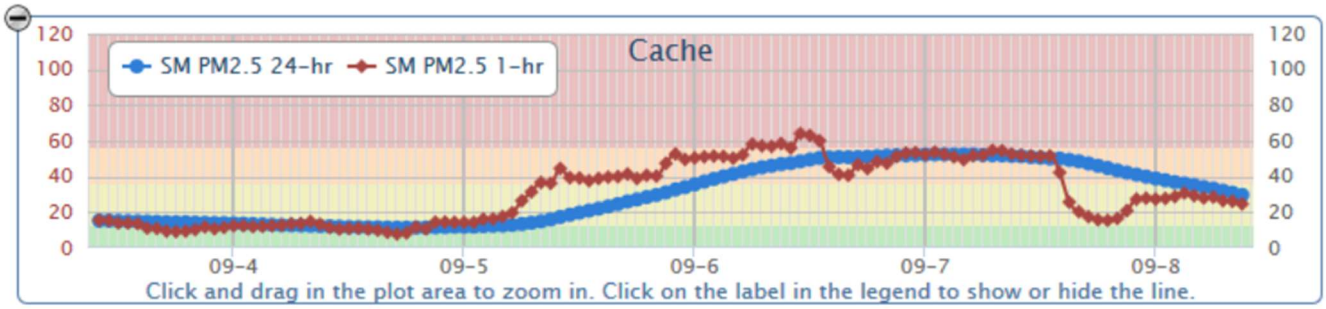

Figure 17. 24-hour and houlry average $PM_{2.5}$ concentrations at the Smithfield monitor from September 4 through September 8, 2017

The EPA Air Quality Index (AQI) maps from September 4 through 7 are below (Figure 18 through Figure 21). The AQI progressed from moderate health concerns for sensitive groups (yellow) to unhealthy for sensitive groups (orange) during this time period. The maps show continuity between the northern Utah degraded air quality and the upwind more severe air quality degradation (unhealthy and very unhealthy) closer to the wildfires.

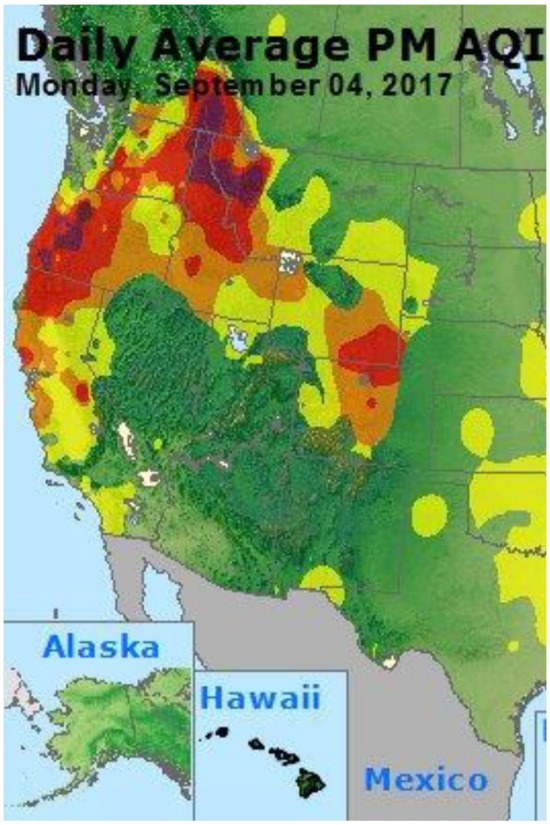

Figure 18. AirNow Daily AQI Map for September 4, 2017

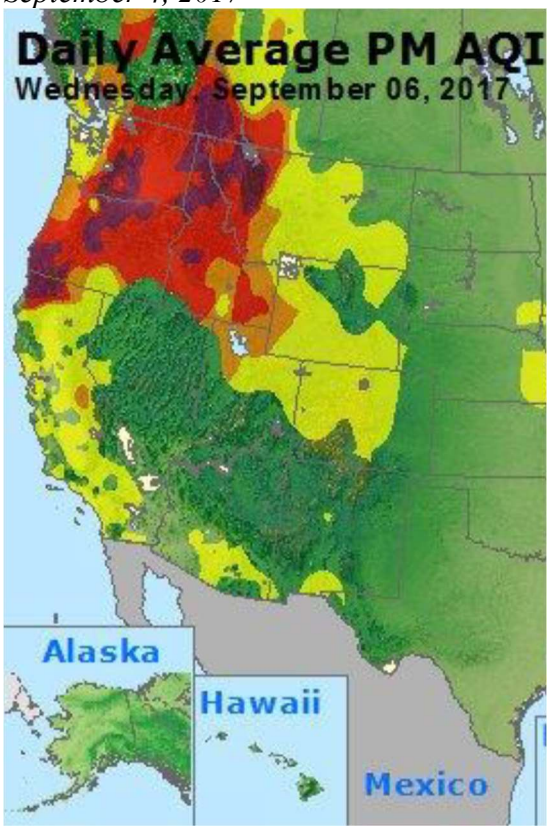

Figure 19. AirNow Daily AQI Map for September 6, 2017

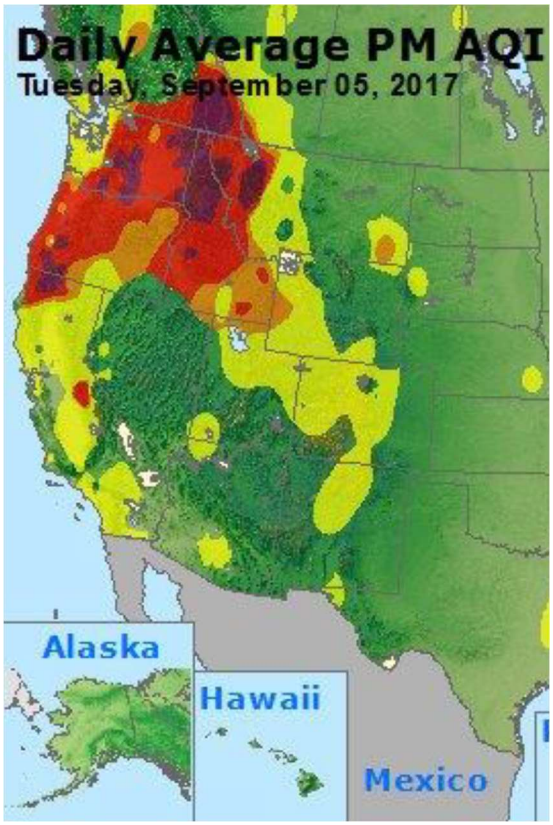

Figure 20. AirNow Daily AQI Map for September 5, 2017

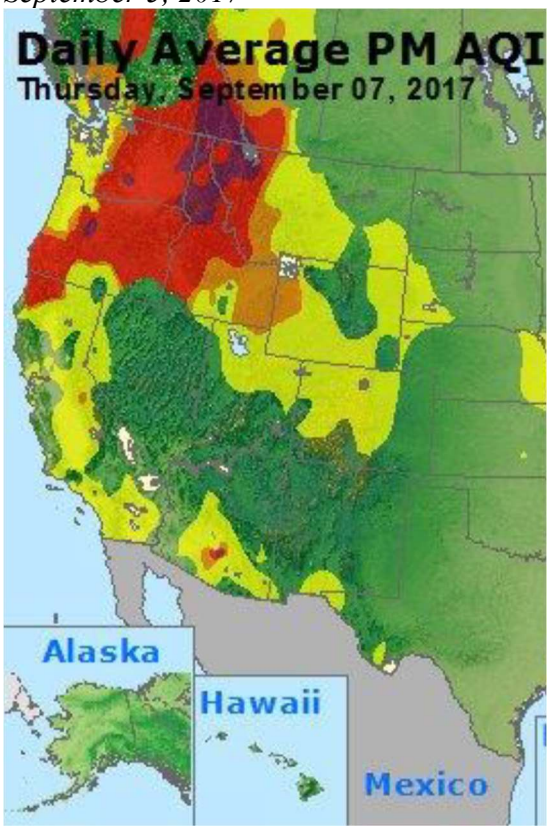

Figure 21. AirNow Daily AQI Map for September 7, 2017

On September 4, 2017, at 0600 MDT, a weak dry cold front was oriented from the northeast corner of Washington to the center of Wyoming, as can be seen in the surface weather maps (Figure 22). This cold front aided in fire intensification throughout Washington, Oregon and Idaho September 4-5, in addition to transporting smoke-rich plumes from these states to the Wasatch Front and Cache Valley of Utah.

By the morning of September 5, 2017 (Figure 23), this cold front had stalled and further weakened into a stationary front, extending from northeast Oregon to west central Colorado (Figure 24 and Figure 25). The stalled boundary further allowed transport from the fires in the Pacific Northwest to the Wasatch Front and Cache Valley, as the particulate values are seen to escalate during this time period.

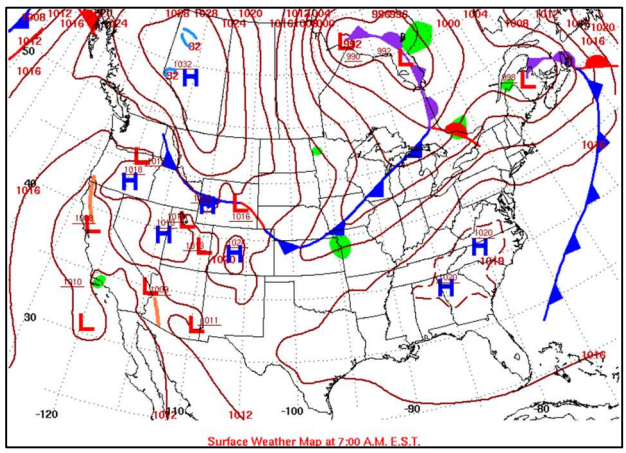

Figure 22 September 4, 2017 Surface Map

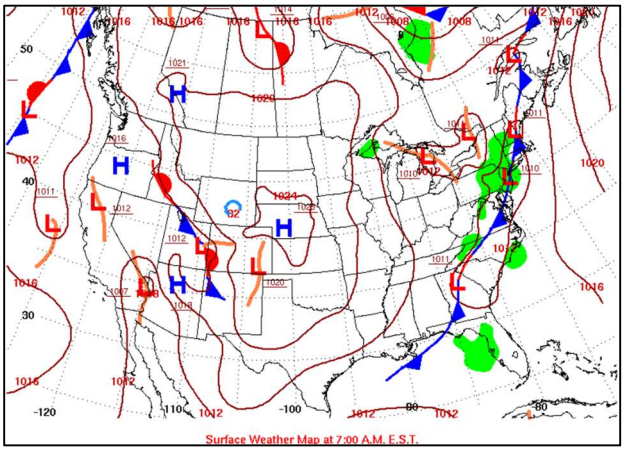

Figure 24. September 6, 2017 Surface Map

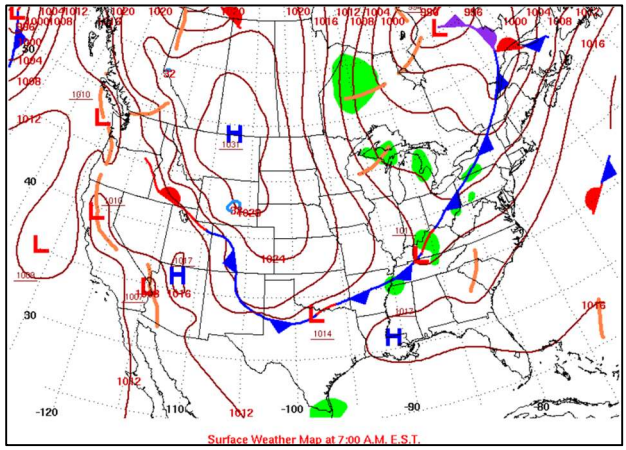

Figure 23. September 5, 2017 Surface Map

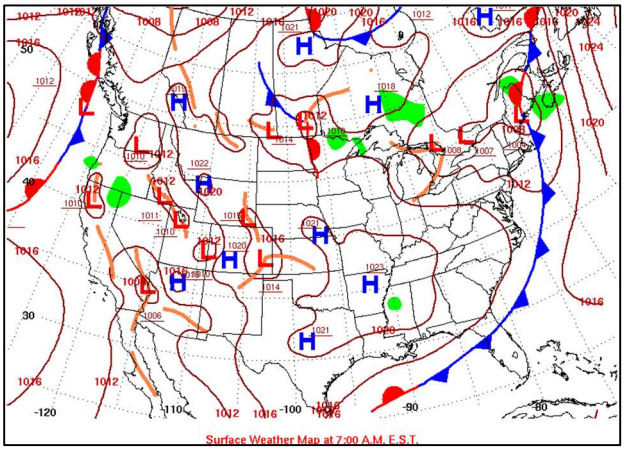

Figure 25. September 7, 2017 Surface Map

Extremely stable conditions due to a high pressure ridge aided in the intensified particulate concentrations from September 4-7, as can be seen in the 500-mB height contour maps (Figure 26 through Figure 29). Additionally, due to smoke being transported at higher levels of the troposphere during this time period, diurnal mixing was not able to mix any clean air to the surface, as smoke was being entrained into the valleys of northeast Utah from above the boundary layer.

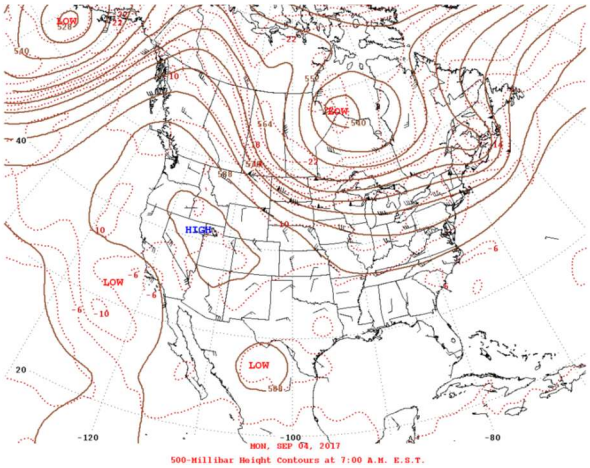

Figure 26. 500 mB Height Contour maps (September 4, 2017 6:00 AM MDT)

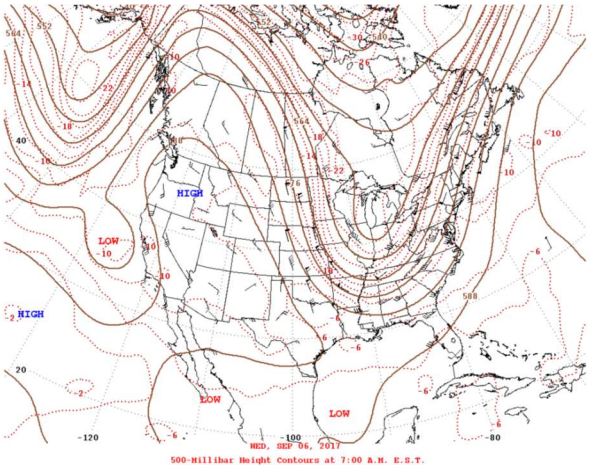

Figure 28. 500 mB Height Contour maps (September 6, 2017 6:00 AM MDT)

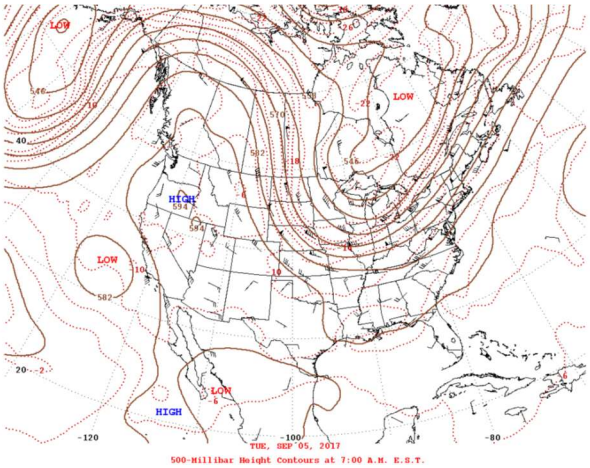

Figure 27. 500 mB Height Contour maps (September 6, 2017 6:00 AM MDT)

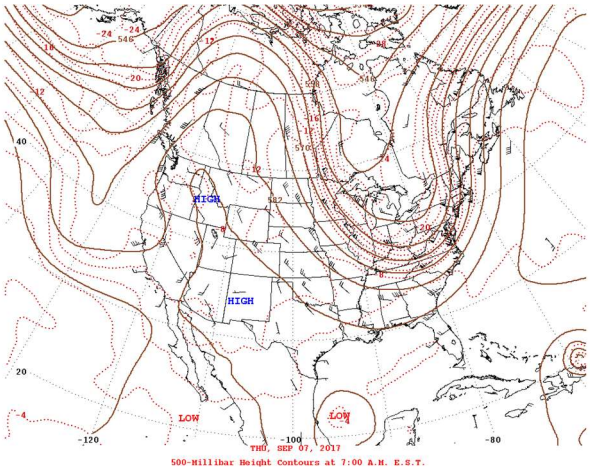

Figure 29. 500 mB Height Contour maps (September 7, 2017 6:00 AM MDT)

On September 8, 2017, the ridge began to shift to the east, allowing for southerly flow to transport smoke-free air from Arizona to the Wasatch front and Cache Valley (Figure 30). Particulate values were subsequently seen to drop down, as seen in the $PM_{2.5}$ time series for each of the stations.

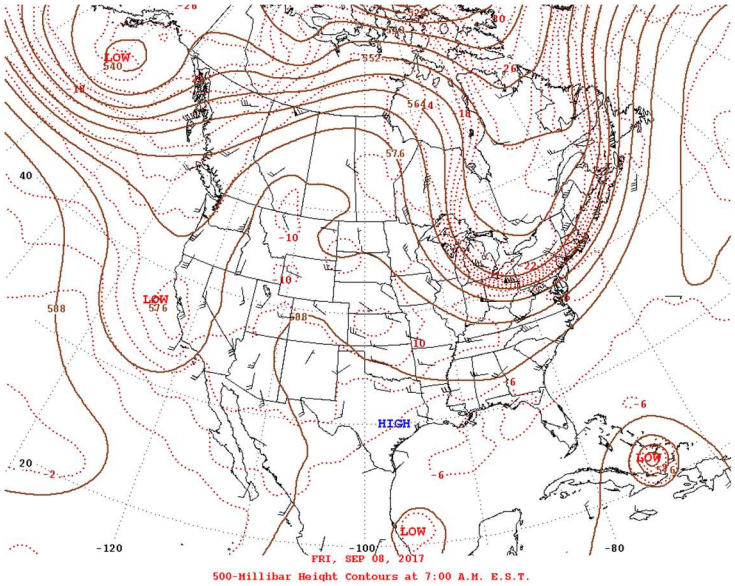

Figure 30. 500 mB Height Contour maps (September 8, 2017 6:00 AM MDT)

Smoke transport can be visibly verified with MODIS satellite imagery (Figure 31 through Figure 33). In these figures, the red markers indicate active wildfire locations and the off-gray wisps are smoke plumes. Brilliant white areas are clouds.

Aerosol optical depth (AOD) is the degree to which aerosols prevent the transmission of light. When most particles are concentrated and well mixed in the boundary layer, satellite AOD measurements can provide supporting evidence of smoke. Smoke intensity is indicated by an increasing color scheme, with red as the maximum AOD. A series of AOD overlays on the MODIS satellite image for September 5 through September 7 are presented in Figure 34 through Figure 36.

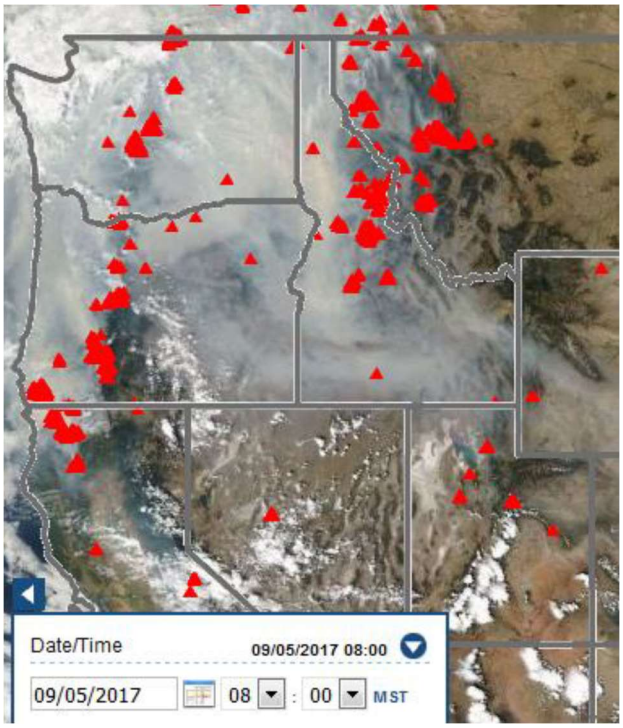

Figure 31. MODIS satellite imagery and wildfire locations for September 5, 2017

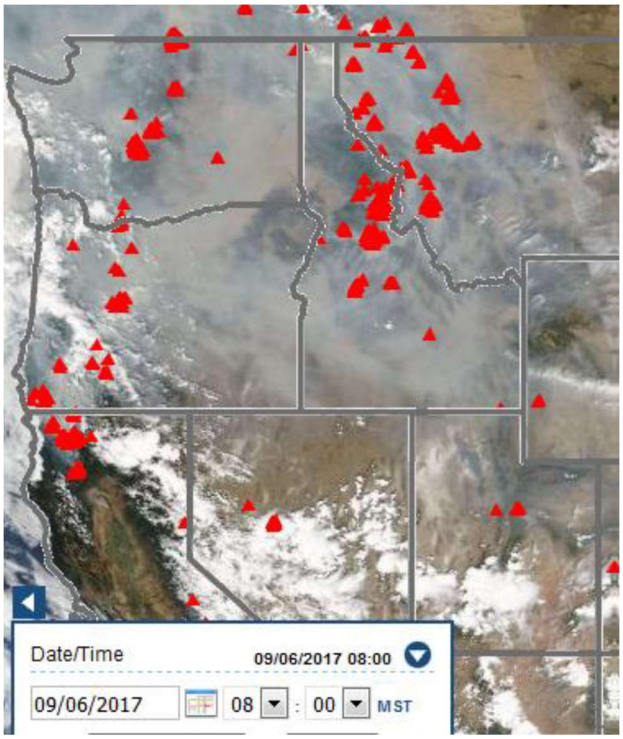

Figure 32. MODIS satellite imagery and wildfire locations for September 6, 2017

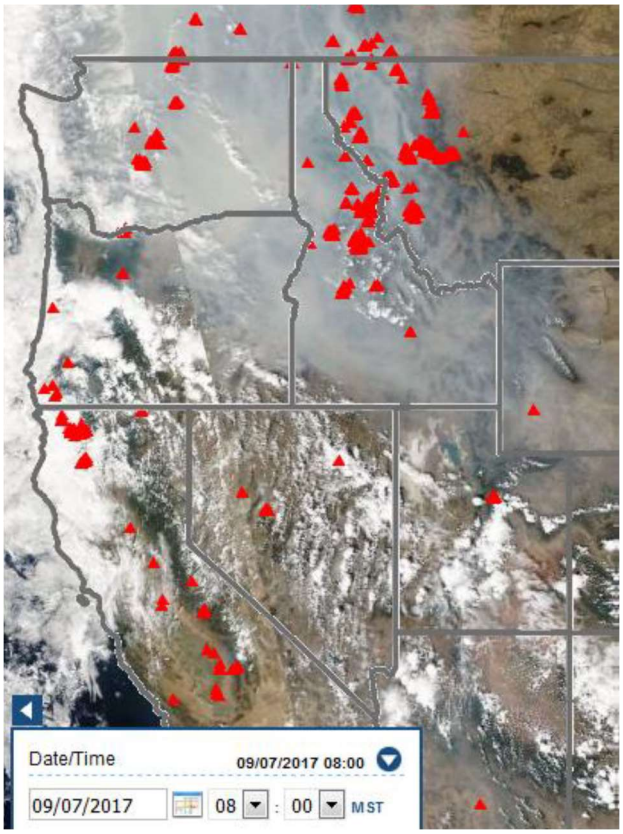

Figure 33. MODIS satellite imagery and wildfire locations for September 7, 2017

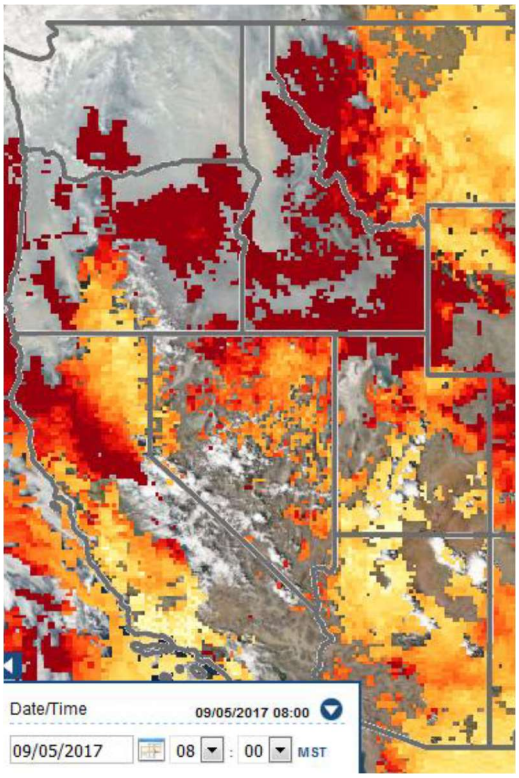

Figure 34. NASA MODIS Terra Aerosol Optical Depth for September 5, 2017

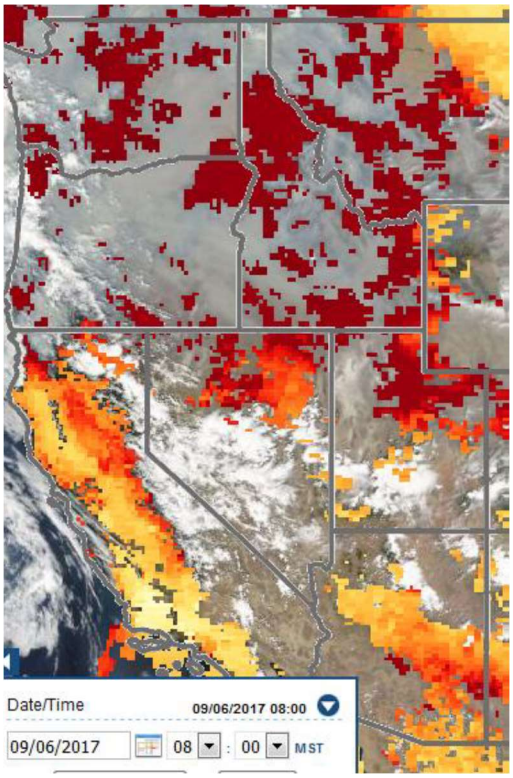

Figure 35. NASA MODIS Terra Aerosol Optical Depth for September 6, 2017

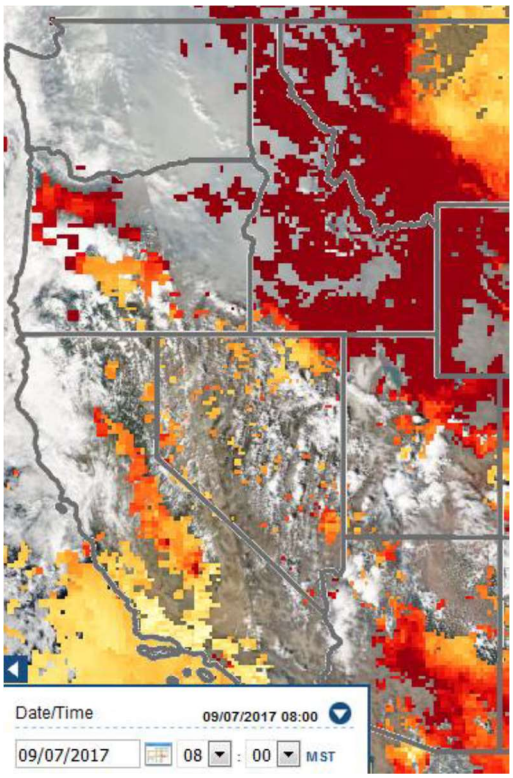

Figure 36. NASA MODIS Terra Aerosol Optical Depth for September 7, 2017

Satellite Remote Sensing of Air Quality using LIDAR

The Cloud-Aerosol Transport System (CATS) satellite uses LIDAR to profile the vertical aerosols. The LIDAR sensor emits radiation directed toward the target to be investigated. The radiation reflected from that target is detected and measured by the sensor. CATS made a pass over the smoke plume areas (area circled in red) during this event on September 7, 2017. The black marking indicates smoke. Note the extensive area where smoke was detected (Figure 37).

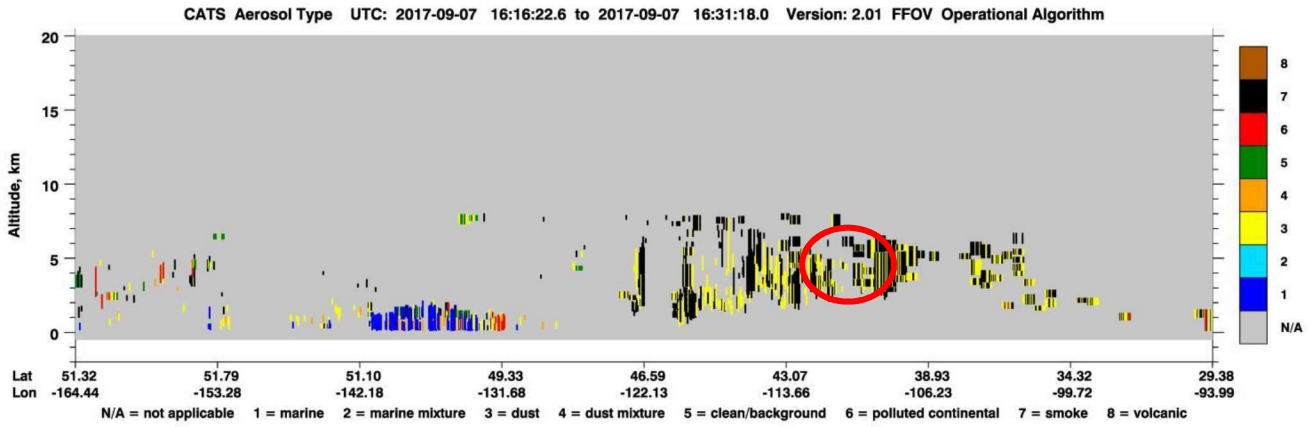

Figure 37. CATS aerosol reading September 7, 2017

Historical Data for Context

The Smithfield monitor started collecting data in 2015 and prior to that, the Logan monitor (2000 through 2014) was the only $PM_{2.5}$ monitor in the Utah portion of the Cache Valley. The data from these two monitors were combined into a single dataset in order to put the August and September 2017 events into historical context (analysis conducted by the EPA to supplement the Utah demonstrations).

As stated in the Narrative Conceptual Model section above, the Cache Valley experiences strong temperature inversions in the winter months. When these inversions are strong and persistent enough, emissions in the valley can cause the 24-hour average $PM_{2.5}$ concentrations to exceed the NAAQS. As a result, the 24-hour average $PM_{2.5}$ concentrations are typically highest from approximately December 1 through March 31 each year (Figure 38). These high values cause the 99th percentile of the combined 2000 to 2017 24-hour $PM_{2.5}$ data to be 53 $\mu g/m^3$.

The historical data also show some elevated 24-hour $PM_{2.5}$ concentrations in the summer months, from approximately July 1 through September 30 (Figure 38). These elevated values are typically recorded in years when smoke from wildfires is transported to the monitoring site. For example, there is an obvious spike in $PM_{2.5}$ concentrations around the end of August and another smaller spike in late September (Figure 38). These spikes were recorded in 2012 and 2015, respectively, and the DAQ flagged the data and submitted exceptional events demonstrations for each. The EPA did not take action on these events for various reasons, but if one removes the 2012 and 2015 24-hour average $PM_{2.5}$ data, the August and September 2017 exceptional events are the only summer concentrations that exceed the 24-hour $PM_{2.5}$ NAAQS (Figure 39). Regardless, these events are still below the 99th percentile of data for the site when including the higher wintertime values.

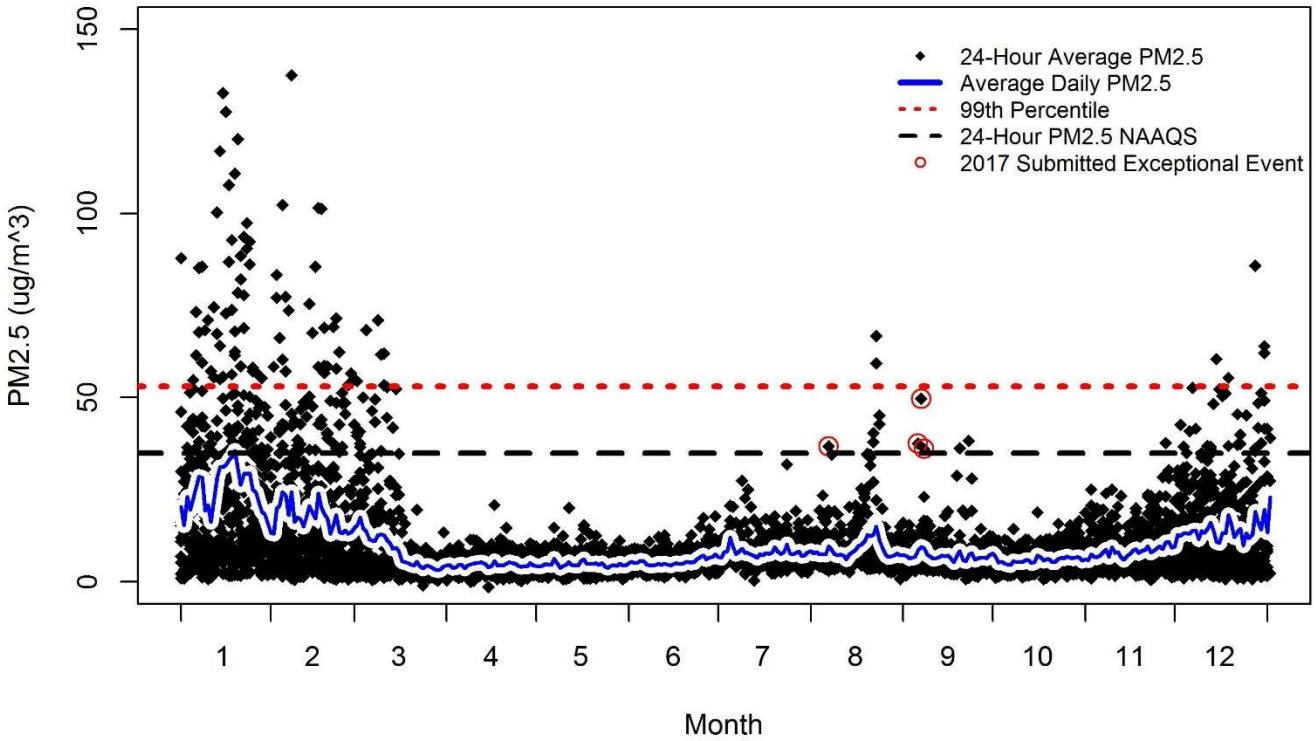

Figure 38. 24-hour average $PM_{2.5}$ concentrations at the Logan (2000-2014) and Smithfield (2015-2017) monitors.

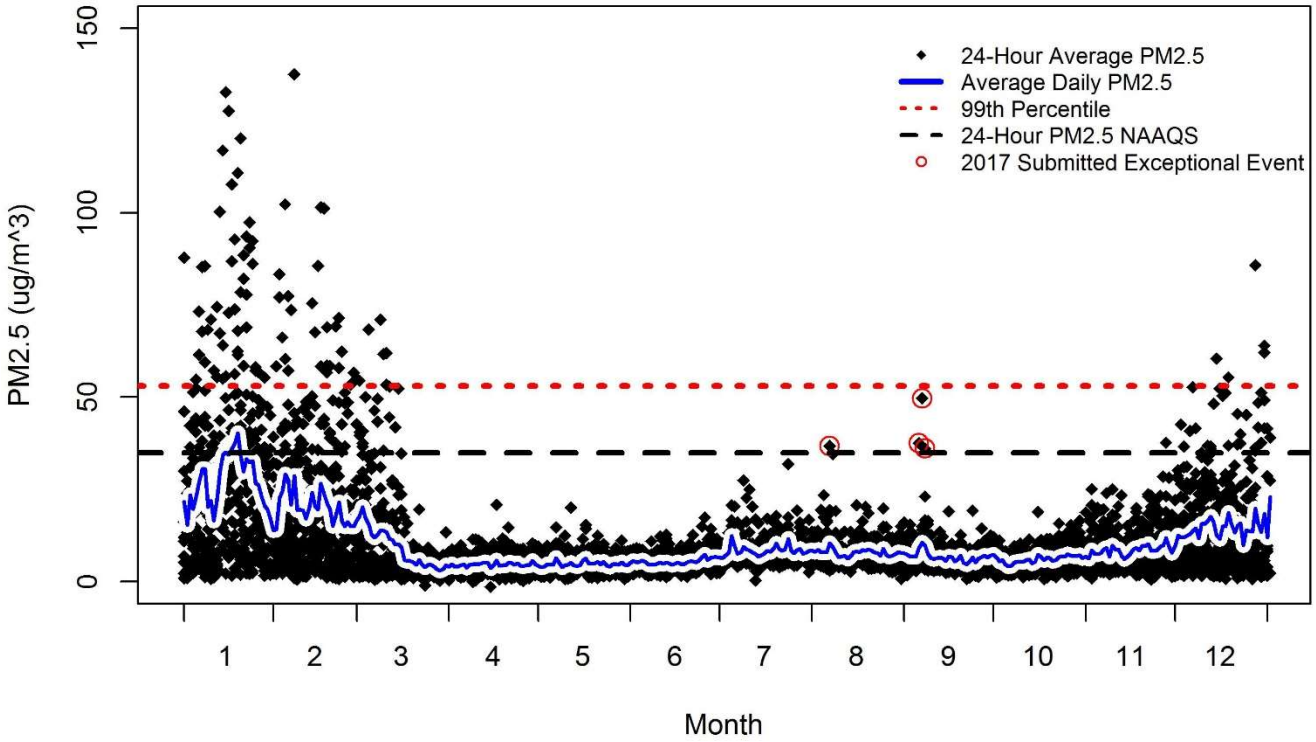

Figure 39. 24-hour average $PM_{2.5}$ concentrations at Logan (2000-2014) and Smithfield (2015-2017) monitors without 2012 and 2015 data.

Because these 2017 submitted exceptional events only occurred in the late summer months, it is appropriate to look at the historical data within the same season to see how the 2017 data compare.

Figure 40 shows the 24-hour average $PM_{2.5}$ values for the Logan (2000 through 2014) and Smithfield sites (2015 through 2017) for July, August, September and October. The 99th percentile of these data is 28 µg/m^3, which is 25 µg/m^3 lower than the 99th percentile of the full year presented above. Therefore, the submitted exceptional events fall well above the 99th percentile of these summer and fall values. In addition, once the 2012 and 2015 data are removed from the dataset (Figure 41), the 2017 submitted events are the only values in this season that are both above the 24-hour NAAQS and above the 99th percentile (19 µg/m^3) of the values.

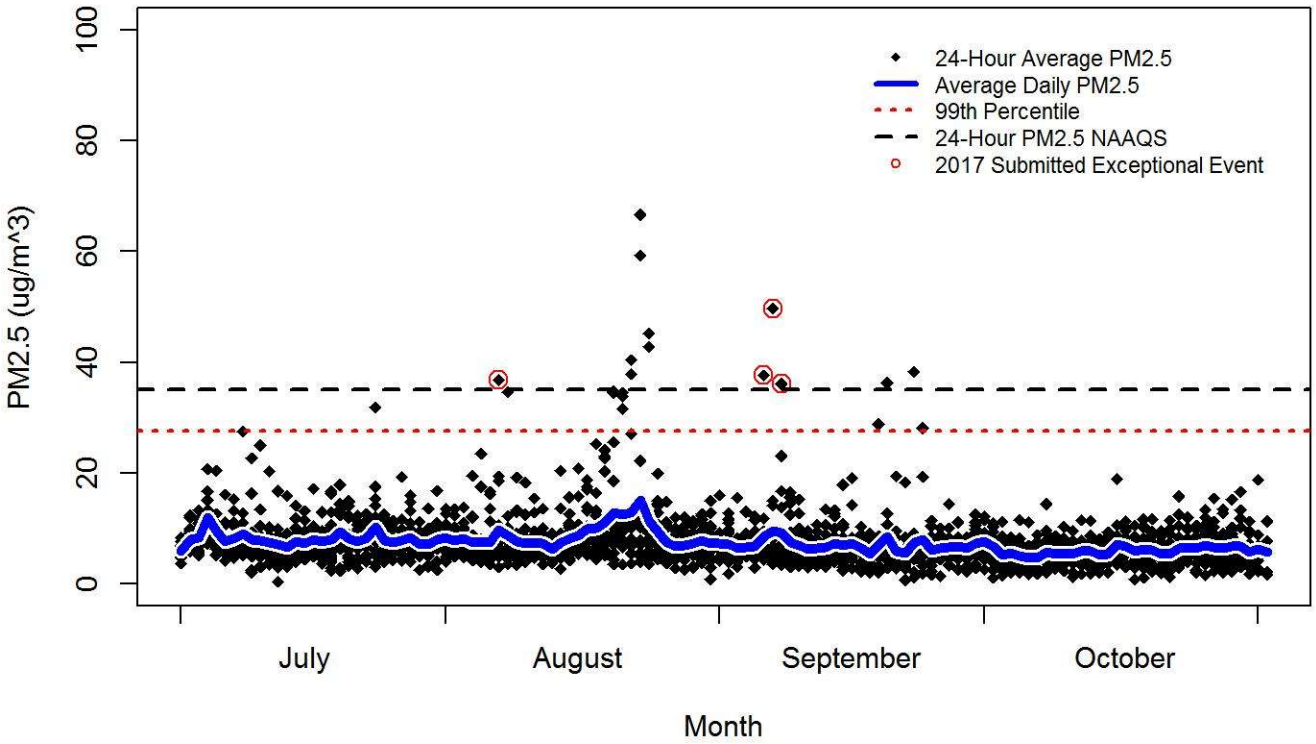

Figure 40. July through October 24-hour average $PM_{2.5}$ concentrations at the Logan (2000-2014) and Smithfield (2015-2017) monitors

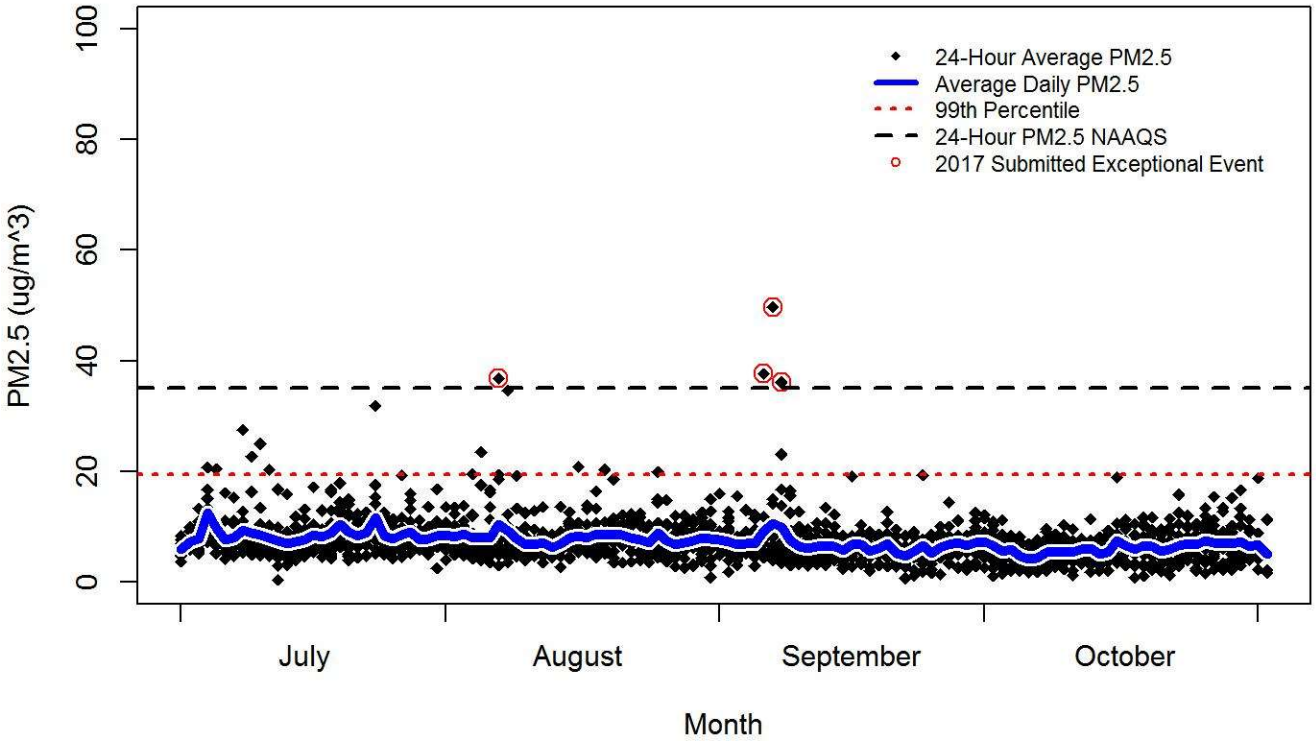

Figure 41. July through October 24-hour average $PM_{2.5}$ concentrations at the Logan (2000-2014) and Smithfield (2015-2017) monitors without 2012 and 2015 data.

Based on the information presented above, the DAQ's Clear Causal Relationship demonstration satisfies the requirements of the EER for both the August and September 2017 events at the Smithfield monitoring site. In addition, the above discussion and historical data comparisons make it clear that although similar concentrations to those recorded in the 2017 submitted events have been observed in the Cache Valley over the past 17 years, they are usually observed in the winter months or during summer smoke impacts.

Not Reasonably Controllable or Preventable (NRCP)

The EER presumes that wildfire events on wildland are not generally reasonable to control or prevent. The DAQ did not show that smoke-producing fires affecting the monitor were wildfires on wildland by definition, so the EPA included the relevant information in this section.

As stated in the Narrative Conceptual Model section above, 2017 was a very active wildfire year in the northwestern United States and western Canada. After reviewing wildfire incident information for many of these wildfires, it is apparent that much of the fire occurred in public or otherwise wildland areas. To support this point, a selection of wildfires over 20,000 acres, and the affected wildland areas, are presented below in Table *1*. Additional information on 2017 wildfires is available on InciWeb (https://inciweb.nwcg.gov/), which is an interagency all-risk incident information management system provided through The National Wildfire Coordination Group.

Table 1. Location, affected wildland areas, and ignition sources of select large wildfires (>20,000 acres) in 2017.

State or Province	Large Wildfire(s)	Affected Wildlands	Ignition Source
California	Modoc July Complex Orleans Complex Salmon August Complex	Modoc NF Marble Mountain Wilderness Marble Mountain Wilderness	Lightning Lightning Lightning
Idaho	Highline	Payette National Forest	Lightning
Montana	Rice Ridge Meyers Fire	Lola National Forest Beaverhead-Deerlodge National Forest	Lightning Lightning
Oregon	Chetco Bar Cinder Butte Whitewater	Rogue River–Siskiyou National Forest BLM Land Mount Jefferson Wilderness	Lightning Unknown Lightning
Washington	Diamond Creek Jolly Mountain Fire	Pasayten Wilderness Wenatchee National Forest	Unknown Lightning
British Columbia	Plateau	Chilcotin Plateau	Lightning

Natural Event

The definition of "wildfire" at 40 CFR 50.1(n) provides: "Any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event." Table 1, and other available information (such as news articles and fire statistics), indicate that many of the fires which contributed smoke to these events were indeed wildfires on wildlands, and therefore natural events by definition.

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR 50.14(c) and 40 CFR 51.930 specify schedule and procedural requirements an air agency must follow to request data exclusion. Table 2 outlines the EPA's evaluation of these requirements.

Table 2. Schedules and Procedural Criteria

Criterion	Reference	Details	Met Criterion
Did the agency provide prompt public notification of the event?	40 CFR 50.14 (c)(1)(i)	DAQ included details of the public comment period in the demonstration cover submission letters	Yes
Did the agency submit an Initial Notification of Potential Exceptional Event and flag the affected data in the EPA's AQS?	40 CFR 50.14 (c)(2)(i)	Initial Notification for August demonstration received on August 24th Initial Notification for the September	Yes

		demonstration received verbally	
Did the initial notification and demonstration submittals meet the deadlines for data influenced by exceptional events for use in initial area designations, if applicable? Or the deadlines established by the EPA during the Initial Notification of Potential Exceptional Events process, if applicable?	40 CFR 50.14 Table 2 40 CFR 50.14 (c)(2)(i)(B)	There were frequent communications between DAQ and EPA. The demonstrations were submitted prior to the identification of a deadline.	Yes

CONCLUSION

The EPA has reviewed the documentations provided by the DAQ to support claims that smoke from numerous wildfires in the United States and Canada caused exceedances of the 2006 24-hour $PM_{2.5}$ NAAQS at the Smithfield monitoring station on August 6, September 5, September 6 and September 7, 2017. The EPA has determined that the flagged exceedances at this monitoring station on these days meet the definition of an exceptional event: the event affected air quality in such a way that there exists a clear causal relationship between the event and the monitored exceedance, was not reasonably controllable or preventable, and meets the definition of a natural event. The EPA concurs with these exceptional event demonstrations. However, any relevant, future proposed notice determining attainment and/or clean data will include the opportunity for the public to comment on our concurrence on these exceptional events, and the EPA will consider any comments received in our final action.